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# Exporting from a Small Landlocked Economy

## An Assessment of Firm-Product-Destination Survival Rates in the Lao PDR

*Liviu Stirbat*
*Richard Record*
*Konesawang Nghardsaysone*

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## Abstract

This paper analyzes previously unreleased firm-level customs transaction data from the Lao PDR in order to assess the determinants of cohort survival among exporters. The authors find that export flows in value terms are dominated by the intensive margin, with large firms continuing to supply the same products to the same markets. On the extensive margin, new export spells for firms, products and firm-product-destination units are very small and short-lived, suggesting that although there is significant experimentation and discovery by firms, there is only limited capacity to stay in markets once an entry is made. Regression analyses of the factors that influence survival past the first year reveal that this is positively correlated with the initial dollar value (starting big makes a difference) and is helped by the firm's experience with the product and the destination, but hindered by a lack of focus. Agglomeration of exporters in the same destination with the same product is beneficial, an effect analogous to external economies of scale. The authors conclude by recommending that the focus of export promotion activity should be on helping existing exporters find and stay in new markets.


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# Exporting from a small landlocked economy
## *An assessment of firm-product-destination survival rates in the Lao PDR*

Liviu Stirbat, Richard Record and Konesawang Nghardsaysone
The World Bank[1]

**Key words:** Exports, Trade, Firm Level, Extensive Margin

**JEL codes:** D21, F14

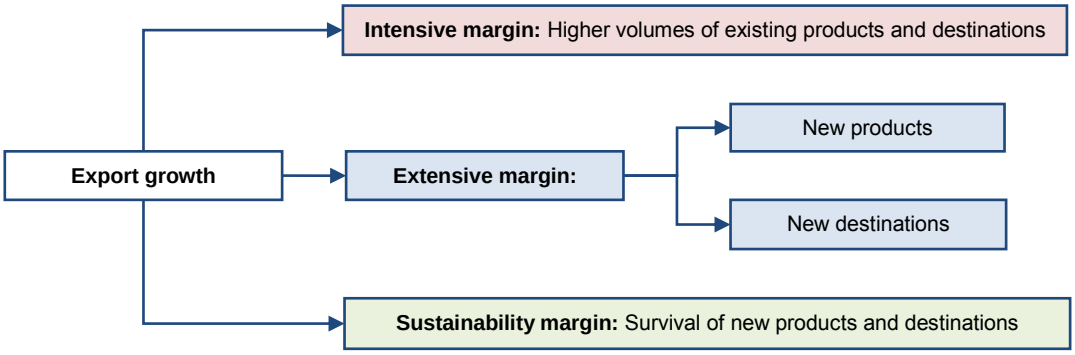
[1] Respectively: Consultant, Trade Specialist and Trade Analyst, World Bank Office Vientiane. Corresponding author: Richard Record, rrecord@worldbank.org. Useful comments were provided on an earlier draft by Stéphane Guimbert, Geneviève Boyreau, Olivier Cadot, Michael Schultze and Sorana Toma. The paper was prepared with support from the Lao PDR Trade Development Facility, a multi donor trust fund financed by the Government of Australia and the European Union, and administered by the World Bank. The data used in this study were generously provided by the Lao Customs Department.

# 1 INTRODUCTION

The body of knowledge in the field of export survival analysis is growing with the development of new concepts that explain and capture the dynamics of the process, but also with the slowly increasing availability of relevant data. This paper contributes to the latter by bringing to light previously unreleased customs transactions data from the Lao PDR. These data lend themselves rather well to survival analysis of the kind carried out in only a few countries so far, but also form an interesting window into the composition of, and the mechanisms behind, exporter behavior in a small developing country such as Laos. The paper borrows from the export survival analysis methodology in work by Cadot, Iacovone, Rauch and Pierola (2010), which investigates survival mechanisms among the exporter populations of Malawi, Mali, Senegal and Tanzania using very similar data sets, and which additionally serves as a rare and valuable reference for comparisons.

Ever since the seminal work of Besedes and Prusa (2006), it has been known that new exporting spells in developing countries tend to be short-lived, with high "death" rates: several other studies have confirmed that the median duration of export spells is very short, typically two to three years (Obashi 2010). Efforts by others using both panel and customs data (Nitsch 2009, Alvarez 2008) have revealed that such spells play a critical role in the process of export growth, showing that besides volume growth (intensive margin) and diversification (extensive margin), there is also a fundamentally important "sustainability margin", carved out of the intensive margin, which focuses on the extent to which new products and destination flows survive in later periods.

**Figure 1:** Three channels of export growth – the intensive, extensive and sustainability margins




Given that traditional export promotion policy has tended to focus primarily on the extensive margin (i.e. helping would-be exporters find new markets and develop export-ready products), this literature suggests that such efforts may not yield significant results if flows of new products and destinations are not surviving in sufficient numbers. Thus, such information can be very helpful in the search for robust and policy-related determinants of export growth, in particular related to this third margin: survival and sustainability. Firm-level data, even if harder to obtain (Gorg 2008), has produced more detailed findings that complement the macro-level results, based on aggregated data, by identifying ways in which export-promotion agencies can overcome market failures and leverage synergies between national exporters in order to achieve a brand name for the country (Molina 2009). For example, Volpe and Carballo (2008) study the

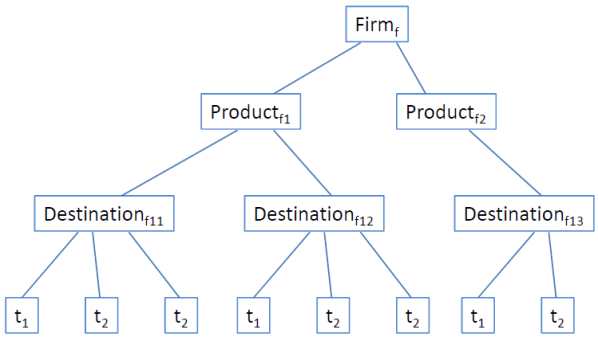
impact of a national export promotion agency in Peru, and find that geographical diversification affects an exporting firm's survival more than product diversification, presumably because a wide destination-base proxies for product quality and that there are rewards to product specialization. Cadot et al (2010) use customs data at the firm-level to study export survival beyond the first year across four countries. They find synergy effects akin to external economies of scale, but which are unlikely to be visible to incumbent exporters – a possible market failure that could benefit from public intervention.

In the paper we proceed as follows: first we describe this novel data set for the Lao PDR and present its strengths and weaknesses. We then continue with a presentation of some descriptive statistics related to the composition of the Lao exporter population, some preliminary statistical results related to survival and two case studies that illustrate this in practice. These results are particularly interesting for research related specifically to the Lao PDR, as they provide a relatively clear and previously unseen picture of the exporter population. The next section presents a more in-depth analysis of the factors that impact survival of exporters past their first year of activity and the dollar value of their initial exports. We conclude by summarizing some of the policy-relevant findings.

## 2 DATA

The analysis relies on raw transaction-level records obtained from the Lao PDR Customs Department, previously unreleased for detailed analysis. The data reports all legal export transactions, with a few exceptions (electric power, an optional HS heading and a significant export for Laos, is not always reported), and includes the entire Lao exporter population. The following information is included: checkpoint code; form type (for special status, tariff exemptions, etc.); date (year, month, and day); HS 8-digit code of the product (a mix of revision 2002 and 2007); export license number; firm name; destination (2-letter code); unit; amount; weight; and value in US dollars (USD) and Lao kip (LAK). The products were aggregated to the 6-digit HS code for international comparison purposes. The detailed and disaggregated nature of the data allows us to identify firms, all products that a firm exports and each destination to which the firm exports a given product.

**Figure 2:** Structure of export survival data




Data coverage spans the period 2005-2010: from the last quarter of 2005, which is the start of the nation-wide deployment of the data collection software system (C-2000) currently used by the Customs Department, until the second quarter of 2010. Further disaggregated by month, the data

show a marked drop in value between May and October 2007, which deviates from the general trend for the period 2005-2010. However, since these values are never zero, they could be attributed to backlogs or administrative changes at some checkpoints leading to lost data. Furthermore, since they appear to be random errors and not targeting specific firms, products or destinations, one can assume that they will be averaged out in the analysis when we aggregate data at various levels. Therefore, only the first and last year have been dropped from the analysis, and this because of their partial time and geographical coverage – 2005 has only 3 months and is presumably more susceptible to data errors as the beginning of the customs system deployment, while in 2010 some major checkpoints had not yet appeared in the data set by the time the data were obtained.

There are 17 major customs administration points across the country, each corresponding to a province (several with further sub-designations of checkpoints), and all report to the customs headquarters in Vientiane. Checkpoint coverage is consistent throughout the period at the province level, meaning that the large majority continuously report trade activity. Nevertheless, some of the sub-units have blackout periods with no reporting, but this is not systematic and can also be due to administrative changes in checkpoint designation and the centralization of reports. Therefore, we do not limit the geographical coverage in any way.

The firm names have been discarded for anonymity purposes, and the firm identification is carried out based on export license numbers. This has both advantages and disadvantages: it helps the analysis because firm names, recorded in Lao script, can have various transliterations and spellings and would make individual identification much harder. On the other hand, we lose some of the information contained in the data. Furthermore, small firms or individuals involved in small scale trade and thus lacking a license are assigned generic codes.

The main shortcoming of using the license number has to do with the identification strategy relevant for this study. In order to deduce firm-level decision-making, firm-level characteristics helping exporters, firm-level risk management strategies etc. we assume that behind the export licenses there are individual firms. This crucial assumption can be invalidated when the licenses belong to brokers, freight forwarders, import-export firms etc., entities that have little to do with the export survival behavior that is of interest here. Moreover, they can reflect other behaviors linked to a firm's identity that are also irrelevant for our purposes, such as mergers, divisions, changed names to avoid taxes etc.

When comparing the customs data with international trade statistics such as those collected by COMTRADE, a number of discrepancies appear. This is most striking when comparing the export destination dollar-value amounts, in particular regarding trade with China, but also the actual number of trade partners. Several possible explanations for these differences exist. Firstly, Lao PDR does not report directly to COMTRADE, and the data used for comparison is mirror data collected from the destination countries. This means that some of the information could be skewed by re-exports, and in value terms there could be significant differences between FOB and CIF values. Similarly, electric power does not appear consistently in the customs data and leads to underreporting when compared with the mirror data. Also of particular concern is the fact that a not insignificant sum of border trade goes unreported (smuggling, traditional trade, illegal logging etc.). In addition, errors in the data collection and data entry procedures can lead to

misrepresentations, particularly with regard to destination countries (destinations are recorded only by two-letter codes, which leads to possible confusions between CN-China, CH-Switzerland and SZ-Swaziland etc.). Last but not least, non-revenue earning export transactions may not be monitored by customs authorities with the same level of diligence as revenue-earning imports.

In order to allay some of these concerns, the data cleaning process has dealt with the following issues: irregularities in product codes (those missing have been excluded and the different HS revisions have been harmonized), destinations (we have not changed designations that we suspect to suffer from an improper coding of country names, but we have excluded transactions with non-standard codes), firm licenses (those missing or having the generic codes have been excluded), and USD transaction values (those having a zero, missing or showing abnormal exchange rates to the LAK value have been excluded, but several transactions that were obviously off by a factor of 1,000 were corrected).

# 3 DESCRIPTIVE EXPORT CHARACTERISTICS

The data were first scrutinized for various effects and trends related to exporter behavior that have been identified elsewhere in the literature. This analysis provides a better understanding of the structure and composition of Lao exports. To achieve this, we require the use of some concepts and instruments developed elsewhere in the literature.. After a brief introduction to these tools, we will then use them to describe some aspects of the data and we will conclude this section with a descriptive look at the survival of exporters.

## *3.1 Concepts and Instruments*

One way to look at the export activity of firms at an aggregate level is to gauge the "quality" of their products. Several indicators or proxies have been put forth that do this, but of particular interest and popularity have been the concepts of PRODY and PATH, first proposed by Hausmann, Hwang and Rodrik (2005) in their seminal paper "What you export matters", and further developed in Hausmann and Klinger (2007). As part of their analysis, Hausmann, Hwang and Rodrik define the related concepts of PRODY (a measure of the "productivity" or "income potential" of a given product), EXPY (an aggregate measure of the productivity or income potential of a country's overall export basket, essentially the weighted average of PRODYs), and PATH (a measure of the scope for future diversification from a product, based on the minimum of probabilities that a country exporting one product will export another). The authors use these tools to construct a framework through which a country's current and potential export performance can be assessed.[2]

In this paper we focus on PRODY and PATH, but we will also make use of the concept of revealed comparative advantage (RCA), defined as:

[2] See Record and Nghardsaysone (2009) for a fuller application of the Hausmann-Hwang-Rodrik methodology to the Lao data.

$$RCA_i = \frac{\frac{x_i}{\sum_i x_i}}{\frac{x_{iw}}{\sum_i x_{iw}}} \quad (1)$$

where $x_i$ represents the country's export of good $i$ and $x_{iw}$ represents the world's export of good $i$. The ratio of a product's export shares in the country and in the world is taken as a proxy for the comparative advantage that the country has in the production of that good: the higher the value, the more the country is believed to have an advantage. We use a categorical variable having 1 for products for which Lao PDR has an RCA, and 0 for those whose ratio is below 1 and thus Lao PDR does not demonstrate an RCA. The RCA's are calculated for the period 2005-2006 (the most recent for which these calculations were available) and show Lao PDR as having an RCA in 211 out of 918 exported products.

PRODY, as the income level of a product, is the weighted per capita income of the countries that export that specific product. The central idea is that *ceteris paribus,* "an economy is better off producing goods that richer countries export". Since a core determinant of income levels across countries is the relative productivity of workers, it makes sense that richer countries should, on average, export products with higher value addition. Hence the measure of PRODY provides us with a useful proxy, albeit one with a number of limitations, for the value that countries gain from producing and exporting different goods. Thus, for example, raw cotton has a PRODY, or income level, of 530 while the value for electronic microcircuits is 11,907. As national incomes and product portfolios change, so does PRODY: the values used here are the 2000-2004 averages.

As a measure of the export diversification potential of a product, PATH, or product distance, is a measurement of the revealed distance between any two products within the product space matrix. Calculating PATH gives an indication as to whether any given product is located in a particularly dense or sparsely populated part of the product space: if the path or product distance is short, factors of production, skills and technology can be more easily deployed from one product to another than if the product distance is long. The product distances for any pair of products are calculated using the minimum of two conditional probabilities: the probability that a country has an RCA in making product *a*, given that it has an RCA with *b*, and vice versa.

The product PATH is then calculated as a measure of the likelihood that countries exporting any given product are likely to export other products and thus can be seen as a notional value of the potential for future export diversification associated with any particular product. Thus, for example, we find that PATH for copper (105) is low compared to the path for footwear (149). This means that there are more opportunities to diversify into other products from footwear than from copper. Within the product space, footwear is surrounded by a much larger number of related products, while copper is located in a more sparsely populated area. As with PRODY, the values used in this paper are the 2000-2004 averages.

### *3.2 Descriptive Statistics*

We begin with a first look at some of the descriptive statistics emerging from our analysis of the customs data. The top section of Table 1 presents the total number of firms, products and

destinations for each of the years where coverage is complete (2006 to 2009) as well as averages (mean and median) for the number of products per firm, the number of destinations per firm and the number of firms per destination. As mentioned in section 2, we analyze the entire population of legally exporting firms, meaning we know nothing about illegal, informal or non-exporting activities.

While the total figures show increases in almost every respect, the averages are more or less stable, even showing occasional decreases. The number of firms is highest in 2009 (608 exporters), but there are slightly fewer destinations than in 2008 (70 vs. 67 countries). The number of destinations seems surprisingly low, especially in 2006 (25), even for a landlocked country like Lao PDR.

The bottom part of Table 1 shows similar descriptive statistics for six other countries, in years where Lao data is available, in order to put this new data into perspective. Comparisons can only be made where equivalent data is available: unfortunately this precludes comparisons with regional competitors to Laos. A high degree of heterogeneity is observed: high-income countries have many more firms active in exporting (Portugal has over 40 times the Lao average), but so does Malawi when compared to Mali, even though both are land-locked African countries with similar-size populations; Portuguese firms export an average number of products within our small cross-country sample, while the Dominican Republic produces ~2.5 times as many. Portugal has twice as many destinations as Senegal, Malawi or Mali. Laos appears to have comparable average figures, except for the mean number of destinations served by firms – although its figure is not far from that of Portugal, it is less than a third of that for Senegal. This seems to suggest there is no obvious linear evolution of these numbers with a country's GDP, and could instead depend on policy, historical ties, geography or other such factors.

**Table 1:** Descriptive statistics - Lao PDR yearly values 2006-2009 for number of firms, number of HS 6-digit products, number of destinations and averages; comparison with other countries

| | Nr. of firms | Nr. of products | Nr. of dests. | Nr. of products/firm mean \| median | | Nr. of destinations/firm mean \| median | | Nr. of firms/product mean \| median | | Nr. of firms/destination mean \| median | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Lao PDR: 2006** | 367 | 198 | 25 | 1.9 | 1 | 1.4 | 1 | 3.5 | 1 | 19.9 | 3 |
| **2007** | 461 | 376 | 48 | 2.2 | 1 | 1.7 | 1 | 2.6 | 1 | 15.9 | 4 |
| **2008** | 565 | 576 | 70 | 2.9 | 1 | 1.8 | 1 | 2.8 | 1 | 14.4 | 2 |
| **2009** | 608 | 598 | 67 | 2.7 | 1 | 1.7 | 1 | 2.8 | 1 | 15.4 | 2 |
| | | | | | | | | | | | |
| **Mali -2006** | 280 | 575 | 99 | 2.5 | 2 | 3.9 | 2 | 1.9 | 1 | 7.2 | 2 |
| **Malawi -2006** | 856 | 932 | 102 | 1.6 | 1 | 4.1 | 2 | 3.8 | 1 | 13.2 | 3 |
| **Senegal -2006** | 715 | 1,653 | 100 | 3.1 | 1 | 6.8 | 2 | 2.9 | 2 | 22.2 | 5 |
| **Tanzania -2006** | 1,359 | 1,689 | 137 | 2.5 | 1 | 3.6 | 1 | 2.9 | 1 | 24.7 | 7 |
| **Dom. Rep. -2009** | 3,031 | 2,812 | 147 | 6.2 | | 2.2 | | | | | |
| **Portugal -2005** | 21,127 | 1,143 | 202 | 4.6 | 2 | 2.8 | 1 | | | | |

*Source:* Lao PDR - authors' calculation based on customs data; Mali, Malawi, Senegal and Tanzania – Cadot et al (2010); Dominican Republic – Molina, Bussolo and Iacovone (2010); Portugal – Amador and Opromolla (2010).

This first look at Lao exports' composition is complemented by a look at the top products (disaggregated at the HS 6-digit and 2-digit level). Table 2 shows a list of products ranked by their total dollar value in the period for which data is available. The domination of copper and related products is immediately apparent (also its steady rise if calculated by year), as well as the important presence of wood, agricultural products and garments. At the 2-digit level, one also

notices electrical machinery and boilers, surprising elements for the Lao economy, but these are mostly artifacts in the data, probably generated by the big mining facilities sending expensive machinery abroad for repairs or following the completion of large construction projects. Copper amounts to 37 percent of total exports for the period, garments and gold for 12 percent each, while wood takes up around 7 percent (although wood is probably the category that suffers most from underreporting).

**Table 2:** Top products by total dollar value of exports 2005-2010; HS 6 and 2-digit level

| # | Product name (HS 6-digit) | Total ($) | Product name (HS 2-digit) | Total ($) |
|---|---|---|---|---|
| 1 | Cathodes of copper | 1,057,962,633 | Copper and articles thereof | 1,547,681,378 |
| 2 | Copper ores & concentrates | 764,432,422 | Ores, slag and ash | 780,567,846 |
| 3 | Copper plates, sheets & strip, of copper | 484,180,639 | Articles of apparel and accessories | 513,636,860 |
| 4 | Gold (incl. gold plated with platinum) | 424,182,631 | Pearls and precious ores | 501,238,471 |
| 5 | Maize (corn), other than seed | 108,141,578 | Wood and articles of wood | 300,669,608 |
| 6 | Coffee, not roasted, not decaffeinated | 92,601,372 | Cereals | 121,872,560 |
| 7 | Men's trousers, bib & overalls | 89,106,353 | Coffee, tea, mate and spices | 96,788,256 |
| 8 | Wood sliced/peeled | 78,479,760 | Electrical machinery and equipment | 35,518,933 |
| 9 | Wood (strips & friezes for parquet) | 66,503,849 | Inorganic chemicals | 32,351,639 |
| 10 | Wood sawn/chipped length wise | 58,368,114 | Sugars and sugar confectionery | 30,679,037 |
| 11 | Men's/boys' shirts of cotton | 53,272,747 | Mineral fuels and mineral oils | 25,945,920 |
| 12 | Men's/boys' trousers synthetic | 52,852,007 | Manmade staple fibers | 23,618,003 |
| 13 | Posts & beams of copper | 40,585,513 | Tobacco and manufactured substitutes | 21,543,518 |
| 14 | Piezo-electric quartz | 39,192,681 | Footwear, gaiters and the like | 19,271,164 |
| 15 | Jerseys, pullovers, cardigans, coats | 35,222,709 | Nuclear reactors, boilers, machinery | 18,269,723 |

*Source:* Authors' calculation based on Lao PDR customs data

We show in Table 3 the top destination countries for the same period. One sees the traditional trade partners and neighbors (Thailand, Vietnam and China) as well as some of the big economies (Japan, the UK, South Korea) but also Swaziland, whose presence is probably due to data entry errors (the confusion with Switzerland). Table 3 also shows the breakdown of export USD values by checkpoint. Checkpoints have been aggregated at the province level (except for Vientiane) to account for possible shifts in designation. The Lao-Thai Friendship Bridges that cross the Mekong River in Vientiane and Savannakhet account for a very large share of trade.

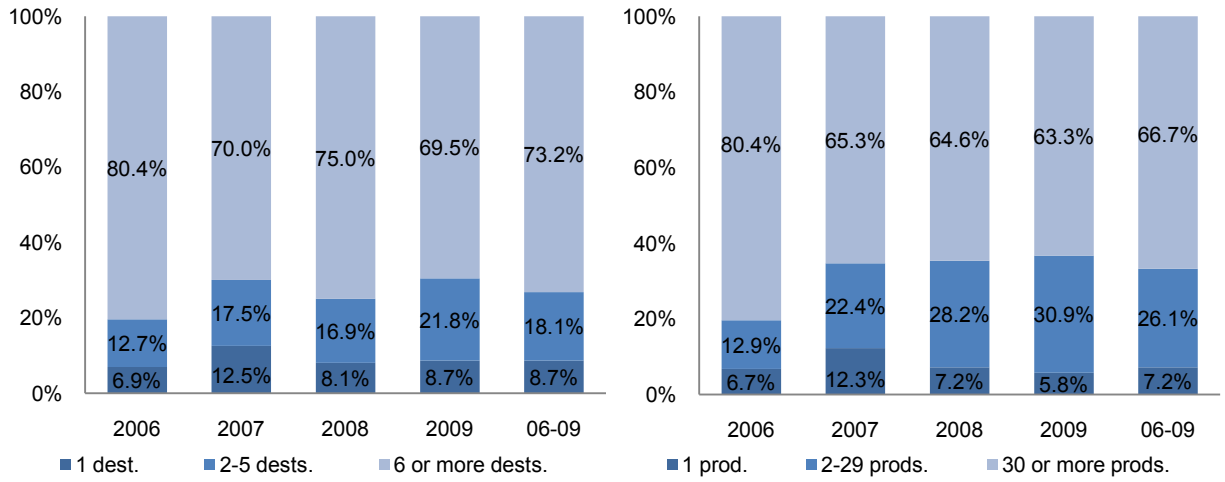
**Table 3:** Top destinations for Lao exports (left) and checkpoint traffic in USD (right) during 2005-2010

| # | Destination | Total ($) | | Checkpoint | Total ($) |
|---|---|---|---|---|---|
| 1 | Thailand | 2,512,047,832 | | ATTAPEU | 439,699 |
| 2 | Vietnam | 519,149,727 | | BOKEO | 33,633,260 |
| 3 | Australia | 415,155,991 | | BOLIKHAMXAY | 41,170,137 |
| 4 | China | 100,688,303 | | CHAMPASACK | 188,966,327 |
| 5 | Germany | 69,124,664 | | HOUAPHANH | 64,897,402 |
| 6 | United Kingdom | 67,799,943 | | KHAMMOUANE | 38,936,155 |
| 7 | United States | 55,428,832 | | LUANGNAMTHA | 63,102,770 |
| 8 | South Korea | 26,835,305 | | OUDOMXAY | 32,808,196 |
| 9 | Japan | 26,665,123 | | PHONGSALY | 2,078,975 |
| 10 | Swaziland | 25,105,752 | | SALAVANE | 6,491,015 |
| 11 | Switzerland | 23,990,556 | | SAVANNAKHET | 1,670,532,715 |
| 12 | France | 23,420,803 | | SAYABOURY | 83,694,346 |
| 13 | Netherlands | 18,347,112 | | SEKONG | 107,221 |
| 14 | Hong Kong SAR, China | 16,254,807 | | VIENTIANE Friendship Bridge | 1,456,287,789 |
| 15 | Poland | 16,065,473 | | VIENTIANE Wattay Airport | 537,681,230 |
| 16 | Belgium | 15,771,328 | | XIENGKHOUANG | 7,559,498 |

*Source:* Authors' calculation based on Lao PDR customs data

Firms can be analyzed at an aggregate level based on several observable characteristics. Such observables include the number of different destinations and products that an exporting firm deals with. The distribution of firms along these characteristics provides some natural category bounds, which are used to investigate how much of the total export USD-value is taken up by each category. Figure 3 shows yearly shares for three firm categories based on the number of destinations to which firms export (1, 2-5, and 6+ destinations) and the number of products that firms export (1, 2-29, and 30+ products), as well as period averages for 2006-2009. The data show that a large share of exports is carried out by fairly sophisticated firms, having six or more destinations (73 percent) and 30 or more products (67 percent). These results, slightly skewed by the mining complexes that send equipment abroad for servicing, show the picture of an economy whose exports are dominated by larger firms.

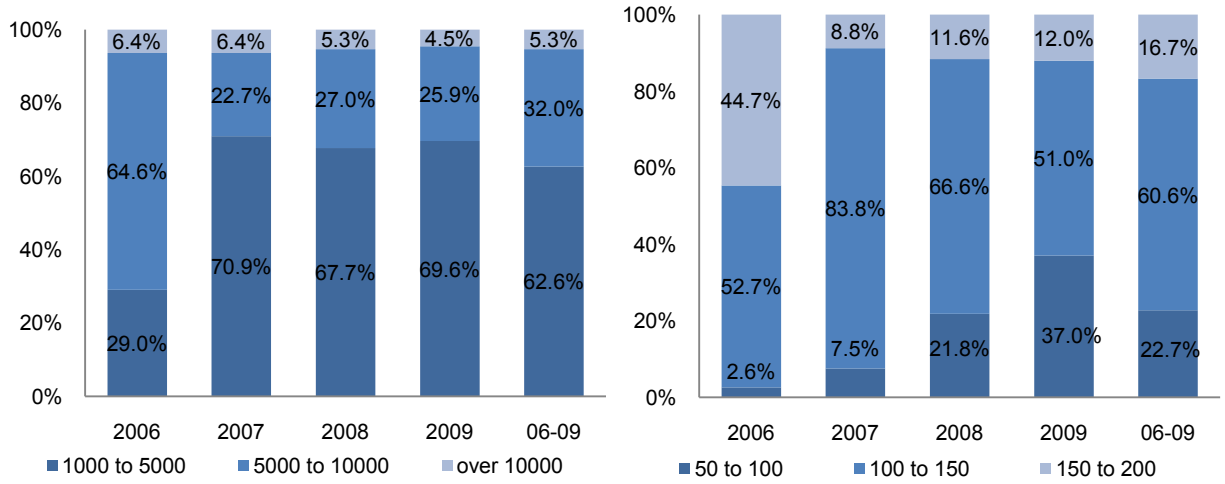
**Figure 3:** Shares of the total export value taken by each firm type: by number of products exported and number of destinations served (yearly in 2006 to 2009, and period averages)




*Source:* Authors' calculation based on Lao PDR customs data

The degree of sophistication of the national export basket as well as its potential for expanding into a wider range of products (diversification is a major concern for a developing economy like Laos (Record and Nghardsaysone 2009)), is another area where the customs data can shed light. Figure 4 shows how yearly export volumes are divided among products with low, medium and high sophistication (as measured by their PRODY value) and similarly for the products' potential for diversification (PATH values). On the left side, we see the picture of an economy dominated by products with a low income potential (produced mostly by low-income countries), and a rather stable composition in time. In 2006 there seems to be a reversal between low and mid-level PRODY, but this is largely an artifact caused by a type of copper product with a very high PRODY value and which was produced in large quantities that year.

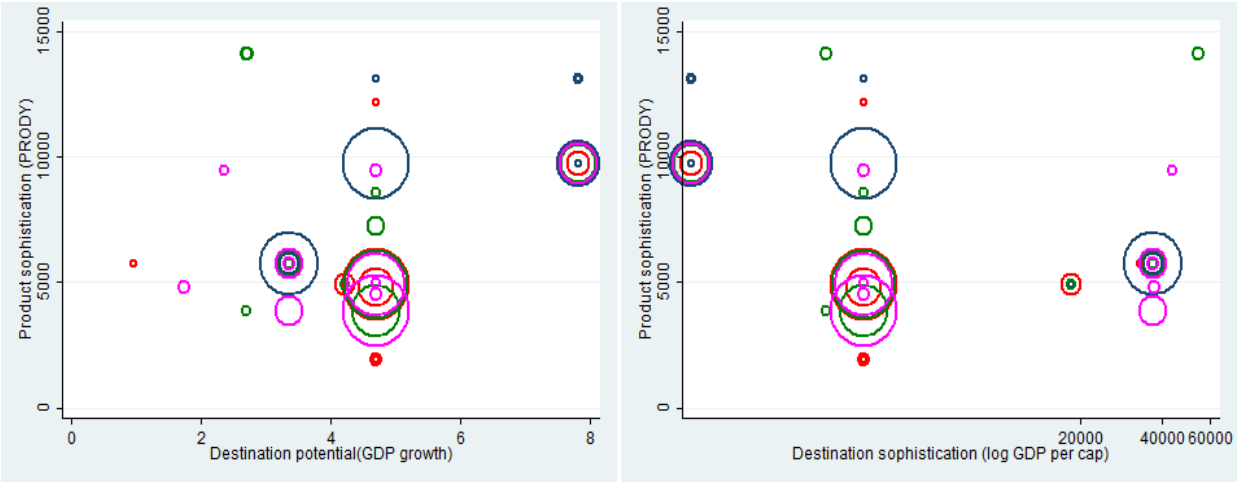
**Figure 4:** Shares of the total export value by product sophistication (PRODY) and potential for diversification (PATH) (yearly in 2006 to 2009 and period averages)




*Source:* Authors' calculation based on Lao PDR customs data

The same artifact can be seen in the PATH chart of Figure 4 (right side) for the same reason – this shows the limitations of the two proxies. Despite this distortion, the PATH chart is useful in painting a picture of mixed trends, showing a sharp rise in value for isolated products during 2007-2009 while at the same time a small increase in value for exports with a high potential for diversification.

**Figure 5:** Top ten firm-product-destination triplets of each year: the size of the circle is the USD value, the y-axis is the income potential of the product (PRODY), the x-axis is the destination GDP growth (left) and log GDP per capita (right), the color is the year (2006 - blue, 2007- red, 2008 - green, 2009 - pink)




*Source:* Authors' calculation based on Lao PDR customs data

**Figure 6:** Top ten firm-product-destination triplets of each year: the size of the circle is the USD value, the y-axis is the potential for diversification of the product (PATH), the x-axis is the destination GDP growth (left) and log GDP per capita (right), the color is the year (2006 - blue, 2007- red, 2008 - green, 2009 - pink)


*Source:* Authors' calculation based on Lao PDR customs data

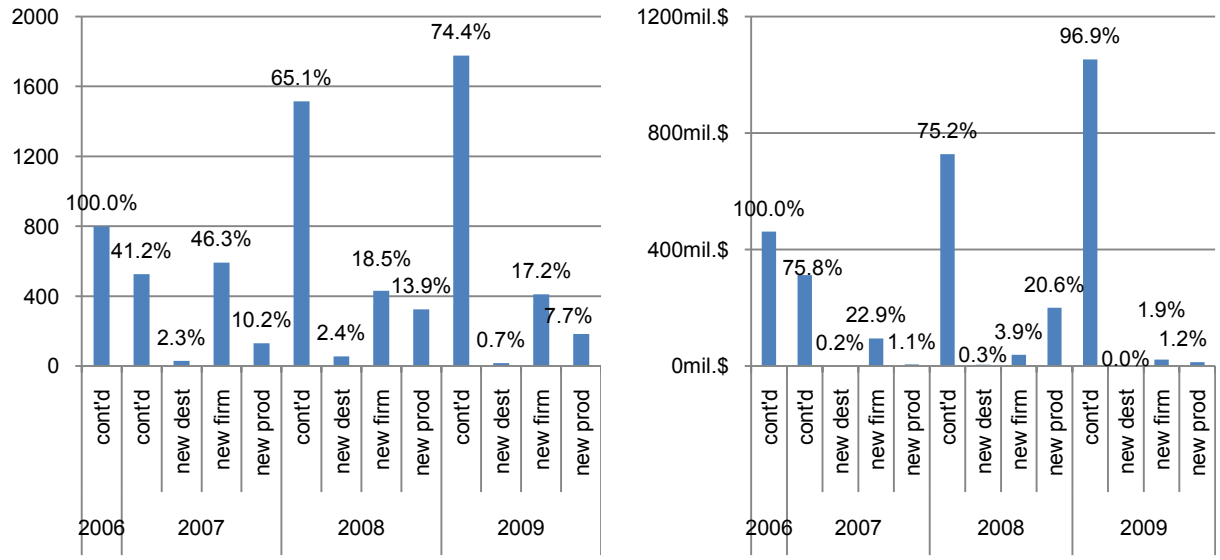
Another way to look at the evolution of Lao exports in this period is to see what the top exports are and where they are sent each year, with the desirable trend being a move towards higher PRODY and PATH products being sent to higher income markets with high GDP growth. We look for this effect in Figure 5 (for PRODY) and Figure 6 (PATH). They are plots of each year's highest value firm-product-destination pairs (one firm, exporting one product to one destination) in the space of PRODY/PATH vs. GDP per capita/growth in the destination. The size of the circle represents the USD value of the export. The desired trend would show up as many large, pink circles in the top right-hand corner of each of the four charts- the 2009 export flows would be more sophisticated and going to markets with higher per capita income or higher growth rates. The charts, however, present a mixed picture and there is no clear trend, although perhaps this is not surprising given the short period for which data are available.

Before turning to some of the exporter-survival figures that are outlined in the following subsection, we present in Figure 7 some results related to the literature on the intensive and extensive margins in export growth (Brenton and Newfarmer 2007). We look for the relationship between yearly transaction numbers and USD value. Following the literature, we aggregate all transactions into annual units of firm-product-destination (FPD) – i.e. the sum of all transactions involving one firm, one product and one destination. We then classify each FPD unit as either having a *new firm*, a *new product* or a *new destination* (meaning present in the data at time *t* but not *t*-1), or *continued* (meaning that everything about the unit was present in the export space the previous year). The *new* tag is hierarchical – firm has precedence over product and destination and product over destination. Thus, an FPD with a new firm and new product will be *new firm*, whereas an FPD with an existing firm but new product to a new destination will be *new product*. The change in the *new* categories from one year to the next is the extensive margin, whereas year-on-year change in *continued* represents the intensive margin.

Additionally, the figure shows the percentage each category takes up of that year's values: for example, in 2008, 65 percent of FPDs were continued from 2007 (about 1,500), but together they

represent more than 75 percent of the aggregate dollar value of 2007 exports (or ~USD 700 million). By default, 100 percent of the 2006 FPDs are continued because of the way the data is arranged: the data is left-censored so we do not know if any of the firms had been active in 2005.

**Figure 7:** Intensive and extensive export margins by number of units (left) and USD value (right); each year, every FPD unit is classified in one of four mutually exclusive groups: new destination (units from old firm, with old product, to new destination), new product (units from old firm, with new product), new firms (all units from firms with no prior exports) and cont'd (all other units). At the top of each bar is the percentage of that year's number of FPDs (left) or USD value (right) that each category takes up.




*Source:* Authors' calculation based on Lao PDR Customs data

What we see in the two tables is that there is a considerable amount of experimentation: some 25-60 percent of FPDs in any one year are *new*, and 2007 appears to have been particularly active. On the dollar value side, however, the incumbents dominate by far, accounting for some 75-97 percent of the value in the three years. This is consistent with the findings of Cadot et al. (2010) on African countries, as well as the conclusions of Brenton and Newfarmer (2007) on the importance of the intensive margin in explaining export growth in developing countries.

This simple demonstration of the fact that exploration and export discovery, even if actively encouraged, account for little of the export value presages the survival analysis which will be presented in section 4. It also illustrates the need to support exporters beyond the exploration phase of their activity (the sustainability margin) in order to have any significant value impact from this exploration (the intensive margin).

### *3.3 Survival Statistics*

As mentioned in the introduction, after the seminal work of Besedes and Prusa (2006), several other papers have confirmed the finding that the median duration of export spells in developing countries is very short, typically two to three years. We investigate this aspect in the Lao data and present a simple view of the spell duration in Table 4 for each of the elements of the export space (firms, products and destinations as well as combinations). To do this, we disregard left and right censoring as well as gaps (absences during one or two years) and instead focus on the number of years that a unit is present in the data during the period of full coverage (2006-2009).

The results are not far from those found in the literature and illustrate the great deal of churning and experimentation that goes on among Lao exporters: close to half of all firms and products and close to three quarters of FPD units last only one year. Because of censoring, we cannot tell how many of the 9.3 percent of firms (105) which appear in all four years could have lasted for another year or continued on from 2005 (making them last five or six years), it is still surprising how few of them succeed in exporting over the medium term.

**Table 4:** Number of years a unit is present in the data (2006-2009)

| | Firms | | Products | | Destinations | | Firm-Prod | | Firm-Dest | | Prod-Dest | | F-P-D | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Active** | **Freq.** | **%** | **Freq.** | | **Freq.** | **%** | **Freq.** | **%** | **Freq.** | **%** | **Freq.** | **%** | **Freq.** | **%** |
| **1 year** | 619 | 55.0% | 451 | 49.1% | 34 | 37.0% | 2,535 | 71.7% | 1,268 | 61.5% | 1,383 | 62.5% | 3,754 | 74.4% |
| **2 years** | 240 | 21.3% | 205 | 22.3% | 18 | 19.6% | 642 | 18.1% | 449 | 21.8% | 469 | 21.2% | 916 | 18.2% |
| **3 years** | 161 | 14.3% | 161 | 17.5% | 20 | 21.7% | 274 | 7.70% | 228 | 11.1% | 261 | 11.8% | 293 | 5.81% |
| **4 years** | 105 | 9.33% | 101 | 11.0% | 20 | 21.7% | 86 | 2.40% | 115 | 5.6% | 100 | 4.52% | 82 | 1.63% |
| **Total** | 1,125 | | 918 | | 92 | | 3,537 | | 2,060 | | 2,213 | | 5,045 | |
| **Mean** | 1.78 | | 1.9 | | 2.3 | | 1.4 | | 1.6 | | 1.6 | | 1.4 | |
| **Std dev** | 1.01 | | 1.1 | | 1.2 | | 0.7 | | 0.9 | | 0.9 | | 0.7 | |
| **Median** | 1 | | 2 | | 2 | | 1 | | 1 | | 1 | | 1 | |

*Source:* Authors' calculation based on Lao PDR customs data

**Table 5:** The number of years an FPD is present in the data, by destination and sector

| Country | #FPDs | 1year | 2yrs | 3yrs | 4yrs | Sector | #FPDs | 1year | 2yrs | 3yrs | 4yrs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Thailand** | 2426 | 72.1% | 20.5% | 5.3% | 2.1% | **Garment/footwear** | 1988 | 72.3% | 21.8% | 5.6% | 0.3% |
| **Vietnam** | 737 | 74.8% | 19.1% | 3.8% | 2.3% | **Wood** | 1142 | 72.5% | 18.5% | 6.2% | 2.8% |
| **France** | 235 | 64.7% | 25.1% | 8.9% | 1.3% | **Others** | 1004 | 79.3% | 13.4% | 5.9% | 1.5% |
| **China** | 188 | 89.4% | 7.5% | 3.2% | 0.0% | **Agriculture** | 653 | 75.5% | 15.6% | 5.2% | 3.7% |
| **Great Britain** | 149 | 67.8% | 19.5% | 12.8% | 0.0% | **Metals** | 145 | 79.3% | 13.1% | 6.2% | 1.4% |
| **United States** | 140 | 75.0% | 16.4% | 8.6% | 0.0% | **Minerals** | 110 | 74.6% | 15.5% | 7.3% | 2.7% |
| **Germany** | 127 | 79.5% | 10.2% | 9.5% | 0.8% | | | | | | |
| **Japan** | 118 | 67.0% | 16.1% | 13.6% | 3.4% | | | | | | |

*Source:* Authors' calculation based on Lao PDR customs data

The same information, for FPDs, can be seen in Table 5, this time disaggregated by sector and destination. The results are quite uniform overall, with no outliers. Concerning destinations, China has the highest percentage of FPDs surviving only one year (~90 percent) and Japan the lowest (67 percent). Japan is also the destination with the highest percentage of long-lived export links (3.4 percent of the FPDs appear in all the four years), whereas China, the US and the EU members have almost no FPDs older than three years. Agriculture has the highest percentage of its FPDs (3.7) lasting 4 years, while the garment and footwear industry has the lowest (0.3 percent), but the sectors seem to be very similar in terms of survival characteristics.

**BOX 1: Export survival in practice - Supply chain constraints restrict exports of fresh vegetables to premium markets in the Middle East**

Exporter A, established in 2004, is a successful exporter of fresh vegetables from the south of Lao PDR with annual exports now reaching US$ 10 million. The majority of exports are to neighboring Thailand, but the firm has recently been trying to move up into premium export markets where the returns are higher. Despite strong orders from buyers in the Middle East, so far the firm has struggled to increase the share of these premium exports to more than 10-15 percent of total sales. The company has managed to meet standards for Halal – certified from Thailand – but is finding the long supply chain from landlocked Laos to end buyers a major impediment. Delays, limited availability of refrigerated transport and poor handling between the original source farms in southern Laos and Bangkok, from where produce is air freighted, is resulting in high spoilage rates and a number of rejected shipments. Produce which fails to meet the buyer's requirements if often redirected to buyers in Thailand. Similarly, when the firm is unable to meet orders, it has to supply from other producers in Thailand in order to fill the buyer's orders and maintain a good client relationship.

**BOX 2: Export survival in practice - Meeting European quality requirements for canned fruit is a challenge**

Exporter B, established in 2000 as the Lao affiliate of a Thai food products company, currently exports some US$ 3m per year of canned bamboo shoots, sweet corn and palm seed. Around 20 percent of exports are to the European Union, of which the largest buyer is based in the United Kingdom. Over the years, the firm has tested a number of new export destinations in Europe and North America, but frequently then withdrawn after encountering challenges. The firm has found that many importers in developed countries are not used to working with exporters from developing countries and unwilling to provide guidance on how to meet their required product standards if the initial shipment is not considered satisfactory. Success in exporting to the UK occurred after the buyer provided detailed information on requirements and offered to work with the firm while changes were made to improve quality. As a result, Exporter B with the assistance of its Thai affiliate, invested in the installation of Good Manufacturing Practices (GMP) and Hazard Analysis and Critical Control Point (HACCP) systems in 2006 in order to meet the buyer's requirements. The result has been a strong relationship with growing exports to the UK. However, further attempts to diversify into other European markets have been unsuccessful as buyers have demanded that products meet additional private standards. The firm has been reluctant to invest in meeting these requirements when buyers have not been prepared to provide details or certainty of orders if the firm makes the necessary investment to meet these additional quality compliance requirements.

Another way to look at survival behavior is to investigate cohort survival rates, as presented in Table 6. For this analysis, units with gap years have been excluded (note that they are very few: for example, only around 4 percent of all firms and 2 percent of FPDs have one-year gaps and

even fewer have two-year gaps). What the table shows is how many of the units that start together in one year make it through to subsequent years, both in absolute numbers (left) and the percentage of the class-size (right). Reading horizontally, we find, for example, that of the 329 firms that were exporting in 2006, only 206 (or 62.6 percent) of them were still active the following year. Vertically, we see, for example, that of the FPDs that are active in 2008, 1,764 of them are new, 399 of them had appeared in 2007 and 127 in 2006. Again, this paints an image of a very high degree of churning in the export sector, with many new faces each year and only a few survivors.

The expected advantages for survivors are experience and robustness. One would expect, however, that the survivors also grow, engaging in higher export volumes and USD value over time. Cadot et al. (2010) find that Senegalese FPDs grow by more than four times in seven years, conditional on survival, while in Tanzania they grow three times in four years. This effect, also noted in Eaton et al. (2008), can also be observed in Laos but is much smaller: four-year survivors increase their dollar value by 50 percent, much less than in the African countries for which we have comparable data. This indicates the possible existence of a barrier to growth, a "learning disability" which prevents successful exporters from taking advantage of their achievement in managing to survive from one period to another.

**Table 6:** Survival rates by cohort: absolute numbers (left) and percentage of initial cohort size (right)

| firms | 2006 | 2007 | 2008 | 2009 | firms | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|
| **2006** | 329 | 206 | 139 | 105 | **2006** | 100% | 62.6% | 42.2% | 31.9% |
| **2007** | | 228 | 135 | 101 | **2007** | | 100% | 59.2% | 44.3% |
| **2008** | | | 273 | 115 | **2008** | | | 100% | 42.1% |
| **2009** | | | | 248 | **2009** | | | | 100% |
| **products** | **2006** | **2007** | **2008** | **2009** | **products** | **2006** | **2007** | **2008** | **2009** |
| **2006** | 160 | 121 | 113 | 101 | **2006** | 100% | 75.6% | 70.6% | 63.1% |
| **2007** | | 235 | 166 | 131 | **2007** | | 100% | 70.6% | 55.7% |
| **2008** | | | 279 | 127 | **2008** | | | 100% | 45.5% |
| **2009** | | | | 206 | **2009** | | | | 100% |
| **firm-prod** | **2006** | **2007** | **2008** | **2009** | **firm-prod** | **2006** | **2007** | **2008** | **2009** |
| **2006** | 645 | 231 | 126 | 86 | **2006** | 100% | 35.8% | 19.5% | 13.3% |
| **2007** | | 706 | 336 | 207 | **2007** | | 100% | 47.6% | 29.3% |
| **2008** | | | 1151 | 349 | **2008** | | | 100% | 30.3% |
| **2009** | | | | 956 | **2009** | | | | 100% |
| **FPD** | **2006** | **2007** | **2008** | **2009** | **FPD** | **2006** | **2007** | **2008** | **2009** |
| **2006** | 738 | 256 | 127 | 82 | **2006** | 100% | 34.7% | 17.2% | 11.1% |
| **2007** | | 957 | 399 | 215 | **2007** | | 100% | 41.7% | 22.5% |
| **2008** | | | 1764 | 525 | **2008** | | | 100% | 29.8% |
| **2009** | | | | 1484 | **2009** | | | | 100% |

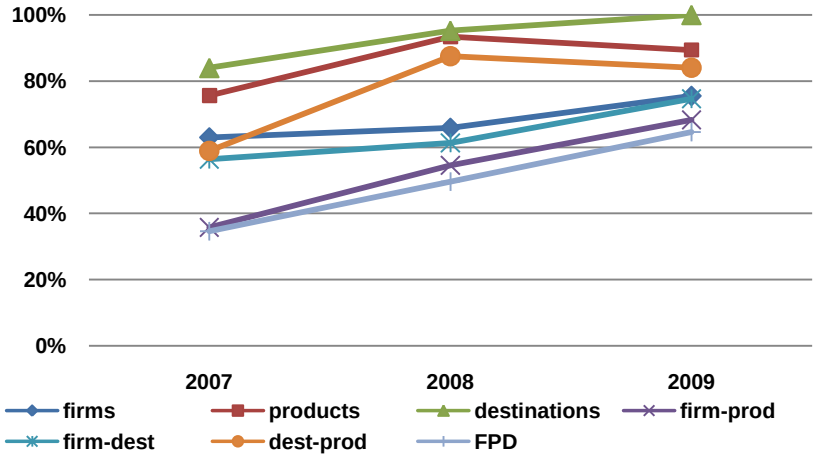
*Source:* Authors' calculation based on Lao PDR customs data

In order to have a more precise understanding of the learning curves related to export survival, we also present in Figure **8** the year-on-year survival rates for firms, products, destinations, firm-products, firm-destinations, destination-products and firm-product-destination units. These

represent the percentage of firms out of the year's population that make it to the following period. We show results for the 2006 cohort, which offers three year-on-year transitions. This way of presenting the data would reveal the "learning" process, whereby firms that survive up to a certain date have a higher chance of hanging on in the future, so the yearly rates should increase towards 100 percent.

Learning is evident in all the six types of units, even though they have different starting points and slopes. FPDs have the lowest starting point, as they are at the finest level of detail in the export space, where churning is at its highest, but after three transitions their resilience rate almost doubles, from 32 to 63 percent. Destinations start very high and reach 100 percent by the third year, which seems to show that there is much less geographical exploration, and firms that make it to a foreign market will do their best to remain there.

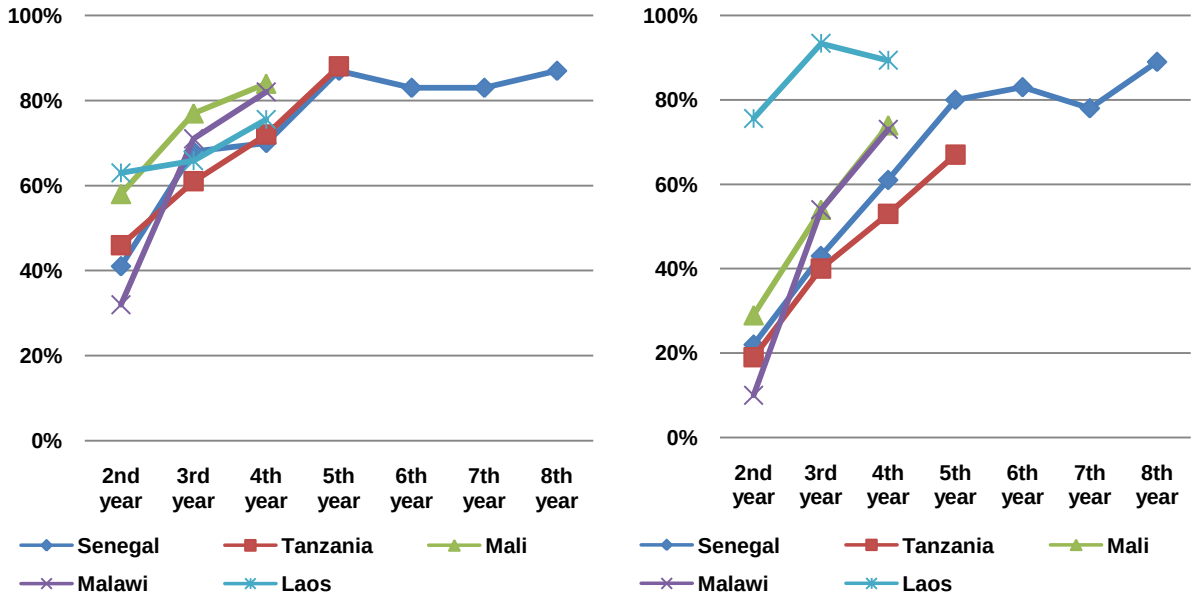
**Figure 8:** Yearly survival rates for firms, products, destinations, firm-products, firm-destinations, destination-products and firm-product-destinations in Laos




*Source:* Authors' calculation based on Lao PDR Customs data

In order to put this phenomenon into perspective, we compare Lao rates with those available for Senegal, Tanzania, Mali and Malawi (comparable data is from Cadot et al. (2010)). Figure 9 presents the evolution of yearly survival rates for the five countries, synchronized despite the different years which the data represent (and thus ignoring any year-specific effects such as global recessions, etc.). Senegal and Tanzania have longer data spans – the Senegal data captures seven transitions and displays an almost asymptotic trend of improvement which stabilizes around 80-90 percent.

**Figure 9:** Yearly Survival rates for firms (left) and products (right) in Senegal, Tanzania, Mali, Malawi and Lao PDR




*Source:* For Lao PDR, authors' calculation based on Lao PDR Customs data; for the African countries, Cadot, et al (2010)

For all countries, the slope in the early stages is very similar, despite their different starting points. For firms, Malawi begins with the lowest rate (~30 percent) and Laos the highest (65 percent), but by the fourth year they are all in the 70-80 percent range, even though this means that Lao experience grew at a slower pace. A different picture emerges for products, where Laos starts off with an incredibly high rate (~75 percent, compared to 10 percent for Malawi) and then seems to level off quite rapidly, meaning that here too it grows at a slower pace. A cautious conclusion, given the short time period, is that Lao firms improve their survival rates at a relatively slower pace, albeit starting from higher levels.

We have seen in this section, through various methods, that exit rates for all units (firms, products, FPDs etc.) are very high, although in a similar range to those countries for which we have comparable data. In the next section we analyze survival per se and its determinants, with a view to drawing policy conclusions that might improve the rates of survival of Lao exports.

# 4 SURVIVAL AND INITIAL VALUE – REGRESSION ANALYSIS

We proceed to identify some of the factors that help a firm's export activity last longer than one year as well as those which help firms to start an export activity (a new product or a new destination) at a higher initial value. This is performed through a regression analysis which requires us to carry out some modifications to the structure of the data.

First, transactions are aggregated to annual totals for unique firm-product-destination (FPD) triplets. The starting year is recorded as that in which the FPD first made its appearance in the data. A surviving quartet (firm-product-destination-starting year) is an FPD that has no activity in the previous year but which appears in the following one. This step essentially reduces the

panel structure to a quasi-cross-section while still capturing a time dimension with the start-year variable.

Because of left and right censoring, we cannot determine whether FPDs appearing only in 2006 or 2009 have already been running or will continue to do so. We disregard gap years, of which there are very few because the period is short: out of ~5000 FPDs, only 100 have one-year gaps and 10 have two-year gaps. Surviving comebacks (starting in 2006, absent in 2007 but active in 2008 and 2009) are marked as having started in 2006. Overall, this binary survival methodology follows the work of Cadot et al. (2010), part of its justification being that it side-steps the issue of how long a spell-break has to be to constitute a "death" – an issue that has been discussed at length in the literature.

Survival of the FPD ($s_{fpdt}$) is therefore defined as:

$$s_{fpdt} = \begin{cases} 1, \text{ if } v_{fpdt} > 0,\ v_{fpd,t-1} = 0 \text{ and } v_{fpd,t+1} > 0 \\ 0, \text{ otherwise} \end{cases} \quad (2)$$

where $v_{fpdt}$ is the USD value of the export of firm *f* of product *p* to destination *d* starting in year *t*.

We are interested in the probability of survival beyond the first year as well as the initial dollar value of exports, and therefore investigate these two outcomes using similar estimation strategies. For the probability of survival we use the probit function $\phi$, reporting marginal effects:

$$\Pr(s_{fpdt} = 1) = \phi(\mathbf{X}_{fpdt}\beta + \delta_i + \delta_d + \delta_t + u_{fpdt}) \quad (3)$$

where $\mathbf{X}$ is a vector of regressors, $\delta_i$, $\delta_d$ and $\delta_t$ are industry (at the HS 2-digit level), destination and time fixed effects respectively and $u_{fpdt}$ is the error term. We use robust standard errors clustered at the product-destination level throughout this section. The vector of regressors includes several counts put in logs and derived from the data itself (the number of products that a firm exports to the same destination, the number of HS2 sectors in which a firm is exporting, etc.) as well as some external data such as the RCA, PRODY, etc. values of the products.

For the other outcome of interest, the initial value at which exporting starts, we use the same setup but we use the log of the dollar value as the dependent variable in an OLS regression:

$$\ln v_{fpdt} = \mathbf{X}_{fpdt}\beta + \delta_i + \delta_d + \delta_t + u_{fpdt} \quad (4)$$

where values are the same as in equation (3).

For the vector of regressors we use several counts to act as proxies for characteristics of firms, products or destination that could have an impact on the two outcomes of interest:

a) The attractiveness of the destination – we proxy this by counting the number of firm-product pairs that are exported to that destination; we expect attractive destinations to have a positive effect on survival, and with destination-fixed effects, the variable captures time dependent variations in the respective markets such as temporary booms.
b) The agglomeration effect at the destination – the number of firms that cater to the same product-destination pair; one would expect either a negative impact caused by the

competitive nature of the destination environment, where only the fittest would survive, or, alternatively, a positive effect stemming from synergies, whereby the cost of discovery is shared among exporters and thus their bottom line is improved as are their odds of surviving.

c) The firm's experience with the product – here, we count the number of destinations to which a firm sends a particular product; we expect experience to have a positive impact on survival and initial value of exports so as to reflect the firm's confidence in the venture.
d) The firm's experience with the destination – we proxy this by the number of products sent by a firm to that destination; again, we expect a positive impact for the same reasons as above.
e) The firm's level of diversification in terms of products – we count the total number of products exported by a single firm; we expect this proxy to have a negative impact on survival because it would signal a lack of focus and attention.
f) The firm's diversification in terms of destinations – similar to the previous one, this is the number of destinations served by one firm.
g) The firm's diversification in terms of product-destination pairs exported – the number of product-destinations served by one firm.
h) The firm's diversification in terms of sectors – here we count the number of HS2 industry sectors in which one firm is actively exporting; we would expect this to be similarly negative, as it would again indicate the firm is not concentrating on a core product/industry.
i) Whether Lao PDR has a Revealed Comparative Advantage in the making of that particular HS6 product – we use an indicator variable which is 1 where RCA>1 and 0 otherwise; we expect a positive impact on survival and value given that RCA should proxy for tested national champions, products with a natural expertise and advantage (Bernard, Jensen and Schott 2006).
j) The logarithm of the initial dollar value of the exports is included as a regressor in the survival models; this helps to show whether starting strong is associated with being able to sustain exporting activity for a longer time.

We present the results of the survival probit regressions in Table 7 and of the OLS regressions on initial dollar value in Table 8. The large majority of the regression coefficients come out highly significant (two thirds are significant at the 1 percent level), which is quite a surprising outcome given the noisiness of the data and the potential for data entry errors (albeit random) which were outlined in section 2.

The baseline regression in (1) is identical in both tables and follows the main setup in Cadot et al. (2010). All of the marginal effects on survival are positive, and with the exception of attractiveness, they are statistically significant at the 1 percent level. Agglomeration has a positive impact, lending support to the rather counter-intuitive view that a strong presence in the same country selling the same product leads to positive synergy effects among the exporters rather than a negative outcome due to competition. The effects of firm experience with both product and destination are positive, the one for products being the highest of all four. This seems to suggest that while experience in general is helpful, knowing one's product well (the number of countries to which one firm exports a given product) is even more so. Such firms have

a deeper understanding of the demand for their product and are thus better at placing it in willing markets in a sustainable fashion.

**Table 7:** Surviving past the first year (probit – marginal effects)

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| **Attractiveness** | **0.132** | **0.0721** | **0.0661** | **0.0136** | **0.0458** |
| **Agglomeration** | **0.236*** ** | **0.177*** ** | **0.201*** ** | **0.192*** ** | **0.176*** ** |
| **Exp. w. product** | **0.868*** ** | **0.811*** ** | **0.824*** ** | **0.820*** ** | **0.903*** ** |
| **Exp. w. destination** | **0.198*** ** | **0.224*** ** | **0.223*** ** | **0.359*** ** | **0.451*** ** |
| **Initial $ value** | | **0.176*** ** | **0.176*** ** | **0.162*** ** | **0.159*** ** |
| **Has RCA** | | | **-0.264*** ** | **-0.256** ** | **-0.251** ** |
| **Firm div. (products)** | | | | **-0.173** ** | **0.0777** |
| **Firm div. (destinations)** | | | | **-0.114** | **0.0574** |
| **Firm div. (P-D)** | | | | | **-0.477*** ** |
| **Firm div. (sectors)** | | | | | **-0.0381** |
| **N** | **3404** | **3404** | **3402** | **1771** | **1771** |
| | *** p<0.10** | **** p<0.05** | ***** p<0.01** | | |

*Source:* Authors' calculation based on Lao PDR customs data

We find similar results for the initial value baseline regression, with all but the attractiveness coefficients significant at the 1 percent level. Experience with a destination is negative this time, indicating that firms which export many products to a destination are more cautious in adding another to the roster and therefore start off at lower values. Experience with the product has a large and positive marginal effect, underlining the confidence effect that is also evident in the survival regression. Agglomeration also comes out with a large and positive coefficient, showing that synergy and discovery-cost sharing emboldens exporters to start large rather than the intensity of competition making them timid.

The coefficients found in specification (1) change very little when the other regressors are included in subsequent models. Model (2) in the survival analysis further includes the initial dollar value as an independent variable. Its coefficient, positive and very significant, reproduces a stylized fact from the literature: confident exporters who start off at higher values also stand a better chance of surviving. This positive correlation is also quite robust to the addition of additional regressors.

Including the RCA of products is positive but not significant for initial values (Table 8). The RCA variable appears to show a strange interaction with the attractiveness coefficient, which becomes highly significant. It loses significance again and reverses sign when the regressors related to lack of focus are included. On the survival side (Table 7), the inclusion of RCA changes little of the baseline coefficients. This is reassuring because there could be an overlap between RCA and our agglomeration measure, but this is not observed.

As mentioned earlier, one would expect that the experience of exporters in comparative advantage and disadvantage sectors should be very different with respect to survival beyond the first year, and one intuitively expects firms exporting products with an RCA to be able to survive longer. This is not the case, as can be seen in Table 7, where the coefficient of the RCA dummy

is negative and significant at the 1 percent level, regardless of the specification – a very puzzling result. To explain it, one could argue for a selection bias, whereby RCA sectors, mostly garments and resource-based, are "popular" with businesses and attract a large number of firms, a sizable share of them being unfit for export, whereas only the high performers try their hand at the non-RCA sectors and hence enjoy a higher rate of success.

**Table 8:** Initial value of exports (OLS)

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| **Attractiveness** | **-0.127** | **-1.564*** ** | **0.111** | **0.144** |
| **Agglomeration** | **0.373*** ** | **0.367*** ** | **0.352*** ** | **0.343*** ** |
| **Exp. w. product** | **0.552*** ** | **0.550*** ** | **0.397*** ** | **0.453*** ** |
| **Exp. w. destination** | **-0.0985*** ** | **-0.0866** ** | **0.319*** ** | **0.375*** ** |
| **Has RCA** | | **0.125** | **0.00621** | **0.0287** |
| **Firm div. (products)** | | | **-0.615*** ** | **-0.264** ** |
| **Firm div. (destinations)** | | | **0.385*** ** | **0.387*** ** |
| **Firm div. (P-D)** | | | | **-0.224*** |
| **Firm div. (sectors)** | | | | **-0.439*** ** |
| **N** | **5042** | **5038** | **2858** | **2858** |
| | *** p<0.10** | **** p<0.05** | ***** p<0.01** | |

*Source:* Authors' calculation based on Lao PDR Customs data

The inclusion of the diversification effects in the survival analysis (Table 7) produces only two significant coefficients, both negative. Exporting many products hurts a firm's chances of sustaining its export links past the first year. The specification including all factors (5) reduces the level of significance, indicating a possible endogeneity among our diversity proxies, but the coefficient for the number of product-destination pairs remains negative and significant. In effect, this proxy is presumably closest to our notion of lack of focus – equivalent to a firm that is basically "shooting in the dark" and trying out many such combinations with high failure rates. There is a potential for multicollinearity between this proxy and those for "experience", as they are closely related count measures (their correlation is ~0.7). In fact, in regressions that have only "lack of focus" and no "experience" variables (not shown) its coefficient becomes positive and significant. But when both are included, as in (5) and other combinations of explanatory variables, it is the only "focus" variable that retains significance and is negative, whereas "experience" is positive and significant.

When it comes to the initial value in models (3) and (4) of Table 8, diversification coefficients are all statistically significant. All are negative but for the coefficient of the number of destinations. This could mean that firms which are exporting to many destinations have indeed built up the necessary savoir-faire, which in turn gives them the confidence to start exporting at high values. Alternatively, this could mean that they face multiplied entry-costs which they can only recover through high volume exporting.

There is a possible land-locked effect appearing in the analysis: the coefficient of the attractiveness variable is positive, quite small and not statistically significant, a situation similar to Mali and Malawi but not Tanzania and Senegal (Cadot, et al. 2010). In the case of the latter two, both larger and with sea access, this coefficient is negative and significant, which implies

that exports follow the booms and busts in the destinations, as captured by the destination fixed effects in the regression. The difference can be explained if small, land-locked countries are more limited in their choice of trade partners than other countries. The fact that this process of following booms and busts is not taking place on the same scale in the land-locked countries could simply mean they have less freedom of choice. Therefore, exporting to attractive countries is not a survival-related choice by the firm but rather a natural constraint: exporters in land-locked countries, facing high trade facilitation costs, are stuck with exporting to their neighbors. However, to really judge the effects of this "landlocked hypothesis" with any degree of certainty, one would need this type of firm-product-destination data from more countries.

**Table 9:** Surviving past the first year (probit – marginal effects) excluding garment or footwear products

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| Attractiveness | 0.141 | 0.0675 | 0.0659 | 0.0458 | 0.0799 |
| Agglomeration | 0.217*** | 0.158*** | 0.185*** | 0.159*** | 0.174*** |
| Exp. w. product | 1.050*** | 0.936*** | 0.952*** | 0.951*** | 1.085*** |
| Exp. w. destination | 0.153*** | 0.180*** | 0.177*** | 0.212 | 0.377*** |
| Initial $ value | | 0.160*** | 0.159*** | 0.199*** | 0.157*** |
| Has RCA | | | -0.260** | -0.0663 | -0.264** |
| Firm div. (products) | | | | -0.0805 | |
| Firm div. (destinations) | | | | -0.0273 | |
| Firm div. (P-D) | | | | | -0.292** |
| Firm div. (sectors) | | | | | 0.00838 |
| N | 2151 | 2151 | 2149 | 1281 | 2149 |
| | * p<0.10 | ** p<0.05 | *** p<0.01 | | |

*Source:* Authors' calculation based on Lao PDR customs data

Finally, as a robustness check on these results, we ran the regressions in Table 7 and Table 8 on a couple of sub-samples. First we dropped all transactions of firms that had exported copper at one point or another, which we refer to as "the copper industry". There is a concern, outlined earlier, that this industry has a significant number of extraordinary exports of machinery, which is, most probably, just sent abroad for repairs. This concerns ~300 of the ~5,000 FPD triplets, singular events which would inflate the creation and destruction of FPD flows, and induce a bias. We find that the results, not shown here, are remarkably similar to Table 7 and Table 8. Furthermore, Table 9 shows the same survival regressions on a sample from which all products with an HS classification as garment or footwear were excluded (~2,000 FPDs). Again, this industry is special in that there are a few large firms, established before the expiration of the Multi Fiber Agreement specifically for the export markets and enjoying some special tax exemptions. We see that the results are again, remarkably similar, with the same signs and magnitudes but a few drops in statistical significance due to higher variance. This analysis confirms the fact that grouping transactions into FPDs is a useful way to filter out some of the noise inherent in the data and therefore produce robust, statistically significant and meaningful results.

# 5 CONCLUSIONS

We have outlined in this paper the results of an export survival analysis based on a novel dataset from the Lao PDR Customs Department that contains firm-level transactions and covers a period

of four years. As mentioned in the introduction, this kind of analysis has been done, traditionally, with aggregated, country level data, which are not plagued with our identification issues but at the same time lack the micro-economic support and policy relevance that firm-level data provide. This kind of disaggregated data is inherently noisier, but strong patterns should emerge through the noise, as is the case in this analysis, with high statistical significance.

In order to gain a relatively clear picture of the structure and composition of Lao exporters as well as a preliminary understanding of their survival-related mechanisms, we first looked at several descriptive characteristics of this very useful dataset. We found that multi-product, multi-destination firms dominate exports in value terms and that products with a low potential for diversification tend to increase their already large presence in Lao exports.

We have also documented the great deal of exploration that goes on every year on the extensive margin (new firms, new products and new destinations) and found that this is dominated, in dollar terms, by the incumbent exports that make up the intensive margin. In terms of survival, there is a relatively high rate beyond the first year, when compared to the few countries for which we have similar data. Nevertheless, only around 10 percent of the firm-product-destination triplets last through all of the four years of our dataset. Thus, churning and realignment of product and destination portfolios within firms is happening at a very rapid pace.

The regression analysis of the factors that determine whether exporting firms survive past the first year of activity and the dollar value at which they start exporting shows that Lao firms profit from focusing on a more limited range of products and destinations. One important and rather surprising fact is that firms benefit when others do the same: the agglomeration of exporters serving the same market with the same product has a large positive impact on the odds of survival and on the initial export value. This means that there are positive spillover effects from the activities of competitors, effects similar to external economies of scale.

There is also a very strong positive impact of having experience with the product (exporting it to many countries) and a negative one for lack of focus (having too many products, serving too many markets, being active in too many sectors). In an apparent paradox, the fact of having a Revealed Comparative Advantage for that product hurts the FPD's survival chances. Moreover, the coefficient of market attractiveness is not statistically significant, something we interpret as a possible landlocked-effect: being stuck with a few destinations, regardless of their appeal, simply because of their proximity. This effect is noticeable in the data for other landlocked countries.

Even though little can be done by policy makers to deal with a country's geography besides road and air infrastructure, thereby increasing the choice of destinations for exporters, export promotion is one tool that has been used to help firms reach larger markets outside their borders. It is in this area that the paper's most interesting conclusions rest, and accordingly we propose two key areas of focus for export promotion policy.

Firstly, our evidence suggests that export promotion support activities should focus on helping existing exporters with a strong track record of exporting a given product to diversify into additional markets. Where resources are finite, they should be prioritized to those activities with the highest returns. Our analysis of export survival suggests that focused firms that specialize in

a limited range of products are more likely to see those flows sustained. Reducing the marginal costs of entering new markets for such firms is thus a low risk bet with potentially high returns. Since the intensive margin dominates by far in dollar value and requires little promotion in order to simply build on past links, the highest returns are likely to be offered via building on the links of established exporters.

Secondly, our analysis similarly indicates that export promotion policy would be best targeted by providing in-market support for firms that have already made the step of discovering a new destination, but perhaps require support to stay in that market. Exporters that have already met the initial costs of export discovery may need support to overcome the high costs of the sustainability margin, perhaps demonstrated through the need to meet destination market standards, establish distribution networks and reach critical mass.

These conclusions represent a departure from traditional export promotion policy, which has tended to focus exclusively on developing the extensive margin (new products and new destinations), and thus the implication is that only a very limited amount of export promotion policy support should be targeted at new firms trying to export to new markets for the first time.

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